

MATH FIELD DAY 2006 RELAYS

Relay A

- A1. Find the x -coordinate of the point on the line $y = 2x - 5$ whose y -coordinate is 1.
- A2. Let k be the number you receive. Find the area of the isosceles triangle that has two sides of length 5 and a base of length $2k$.
- A3. Let k be the number you receive. Find the remainder you get when you divide $k + 2000$ by 17.
- A4. Let k be the number you receive. Calculate the value of $k^3 - 5k^2 - 16k + 80$.
- A5. Let k be the number you receive. If the interior angles of a regular polygon measure $6k^\circ$, how many sides does the polygon have?

1. 3

2. 12

3. 6

4. 20

5. 6

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Relay B

B1. Solve the equation $\sqrt{2^x + 1} = 3$.

B2. Let k be the number you received. How many negative numbers satisfy the equation $x^k = 3kx$?

B3. Let k be the number you received. Find the hypotenuse of a right triangle with two legs of lengths $k + 4$ and $7k + 5$.

B4. Let k be the number you received. Find the greatest common divisor of $k - 1$ and $\frac{3k + 1}{k - 3}$.

B5. Let k be the number you received. Find the probability (as a fraction) that, when tossing k fair coins all at once, a total of k heads turn up.

1. 3

2. 1

3. 13

4. 4

5. $\frac{1}{16}$

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Relay C

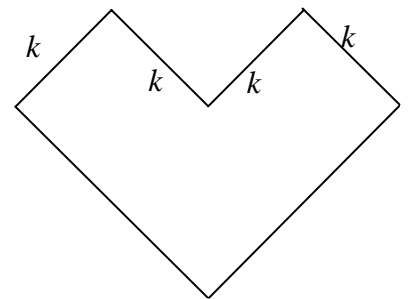
C1. Find the smallest common factor larger than 1 of the numbers 30 and 42.

C2. Let k be the number you receive. Evaluate the expression $\frac{3+k}{9-k^2}$.

C3. Let k be the number you receive. Find the product of k and the largest prime factor of 30.

C4. Let k be the number you receive. Find the y -coordinate of the intersection of the lines $x + y = 4$ and $y = kx - 2$.

C5. Let k be the number you receive. Find the area of the shape shown at right, if all angles are right angles.



1. 2

2. 1

3. 5

4. 3

5. 27

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Relay D

D1. Solve the equation $5^{2x} - 5^x = 0$.

D2. Let k be the number you receive. Find the larger y -intercept of the circle with center $(0, 12)$ that passes through the point $(0, k)$.

D3. Let k be the number you receive from the front and h be the number you receive from the back. If $x^2 + y^2 = k$ and $xy = \frac{h}{2}$, find $(x + y)^2$.

D4. Let h be the number you receive. Find the y -coordinate of the point where the line with slope h and y -intercept 5 intersects the line with equation $x = 10$.

D5. How many revolutions does the hour hand on a standard clock make in a day?

1. 0

2. 24

3. 49

4. 25

5. 2